United States Department of Agriculture

Soil Conservation Service

and

Agricultural Research Service

and the

University of Arizona Agricultural Experiment Station

Notice of naming and release of 'SECO' drought-tolerant barley (Hordeum vulgare) for erosion control plantings, winter cover crop, green manure crop and to provide feed for wildlife on disturbed land or abandoned cropland.

The U.S. Department of Agriculture, Soil Conservation Service and U.S.D.A. Agricultural Research Service and the University of Arizona Agricultural Experiment Station announce the naming and release of 'SECO' drought-tolerant barley (Hordeum vulgare L.) for commercial production and marketing of seed.

Origin: Barley breeding program, R. T. Ramage, ARS, Tucson, Arizona.

Other Identification Used: 'SECO' has been tested under the following control numbers: 2-22-1 U of A Agricultural Experiment Station, Tucson, Arizona; 9047432 USDA-SCS, National Plant Materials Center, Beltsville; Maryland.

Description: 'SECO' barley is a robust and erect six-rowed, rough-awned spring barley. The culms are erect, 75 to 120 cm tall. The leaf blades are flat, 5 to 15 mm wide; the collars are closed. The spike is lax, 4 to 9 cm long, excluding awns; non-waxy, erect to inclined. It has a rachis with long-haired edges. The lemma awn is long and rough, mostly 12 to 15 cm. The lemma has a depression at its base. The glume awn is shorter than the length of the glume. Glumes are one-half to two-thirds the length of the lemma and covered with long hairs. The glumes are divergent at the base, narrow, nerveless, gradually passing into a stout awn. The rachilla is long-haired. The stigma is hairy. The kernels are covered, white and long. The hulls are slightly wrinkled to semi-wrinkled. 'SECO' has erect, early growth and is earlier maturing than any commercial barley cultivar.

Root Development: The crown of 'SECO' is one-to-two inches below the ground surface; root development extends downward beyond six feet under favorable conditions. Deep rooting gives this variety excellent drought tolerance and provides good erosion control.

Development and Use: 'SECO' barley was comparatively evaluated with 27 accessions of barley in over 50 test plantings during the past 5 years by R.T. Ramage, ARS and the University of Arizona. 'SECO' was selected as the best overall performer in vigor, height, root spread and yield on dryland plantings in Arizona and California. 'SECO' also had the earliest harvest date of any

commercial spring barley cultivar. This variety has shown superior performance to standards of comparison 'Signal', 'Bold', 'Arivat' and 'Briggs' under reduced water-use conditions in the hot and arid southwest.

The yields under dryland conditions with no pre-plant irrigation, depending on residual soil moisture and seasonal rainfall, have exceeded more than 2,000 lbs/ac. There are about 10,000-11,000 seeds per pound (22,000-24,000/kg.)

The optimum planting date in southern Arizona and California is November 25 to December 30. Recommended drill seeding rate is 20 to 30 pounds per acre. The average harvest date is April 15 to April 30.

'SECO' was selected for use in critical area stabilization, winter cover crop, green manure crop and to provide feed for wildlife on abandoned cropland, especially where water is limited.

Area of Adaptation: Historically, barley occurred naturally from southern Europe to Turkey, Iraq and Iran, Ethiopia and other temperate regions of the Old World; it grows on a variety of soils receiving 8 to 40 inches of annual precipitation. Barley is also known to be tolerant of saline soils.

The environmental range of 'SECO' drought-tolerant barley, is not known. Observations have shown it to be adapted when grown as a winter barley in southern Arizona and California, at elevations from sea level to 3000 feet (914 m). 'SECO' has been planted and has performed well in the 8 to 10 inch (20 to 25 cm) annual precipitation zones. However, it may require a minimum of 3.5 inches (9 cm) of winter precipitation to produce adequate vegetation and a seed crop. 'SECO' appears to have salt tolerance equivalent to other high-salt-tolerant barley strains. It has been planted as a spring barley in Oregon, Washington, Idaho and Montana with good success.

Seed Source: Breeder seed will be maintained by R. T. Ramage, ARS, Tucson, Arizona. The Tucson Plant Materials Center will be responsible for maintaining a supply of foundation seed. Foundation seed will be available to growers for commercial production of certified seed through the Arizona Crop Improvement Association and natural resource conservation districts. Standards for all classes of seed will be included in the Arizona Seed Certification Handbook.

A suggested release date of 'SECO' drought-tolerant barley is March, 1987. Limited quantities of foundation seed will be available immediately for commercial seed production.

Arizona State Conservationist
USOA - Soil Conservation Service

12/2/86
Date

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4/20/87
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SUPPORT DOCUMENTATION FOR THE RELEASE OF 'SECO' BARLEY

History of 1ine 2-22-1

The world collection of barley was increased in 1966 and 1967. Male sterile diploid plants from the balanced tertiary trisomic 27d msg2 were planted across the ends of the increase rows. Outcrossed seed were harvested and the bulk F3 was designated CC XXX-B. A male sterile facilitated recurrent selection program for performance under a one-irrigation regime was started in the winter of 1974-75 in the F2 of CC XXX-B. The F2 of the 4th cycle of recurrent selection was grown in the winter of 1978-79. Head selections were made and F3 rows from them were grown in the summer in Montana. Single plants were selected and seed from them grown in F4 rows in the winter of 1979-80. Rows were selected and seed from one head from each were grown in F5 rows in Montana in the summer of 1980. Single plants were harvested from the rows and grown in F6 rows in the winter of 1980-81. Selections were made among the F6 rows and the seed from single plants from the selected rows were grown in Montana in the summer of 1981. These F7 rows were harvested in bulk and seed from them used to plant yield trials in the winter of 1981-82. Entry 1 from the yield trial 82-CG-6822 was designated 2-22-1 The line has been tested in various parts of the country from 1983 to 1986. The bulk F11 from the F8 grown in 82-CG-6822 was used to plant a yield test in 86-Ma-6821. Heads from the guard rows were harvested and grown in head-rows in Montana in the summer of 1986. Rows that did not conform to expected type were discarded. Ten individual heads were harvested from each of the remaining rows and then each row was harvested in bulk. Seed from the rows were examined and those that did not conform to type were discarded. The remaining seed lots were bulked to form breeders seed. One set of the individual heads was planted in Marana in the winter of 1986-87. After discarding any rows that do not conform to type, the rows will be bulked to form another lot of breeders seed. The other 9 sets of individual heads from the 1986 Montana nursery are pre-breeders seed and will be used to produce new lots of breeders seed and should be enough to last for the life of the cultivar.

SUPPORT DOCUMENTATION FOR THE RELEASE OF 'SECO' BARLEY

Characteristics of barley line 2-22-1

Six-rowed, rough-awned spring barley; erect early growth; plant very early, midtall to tall; collars closed; rachis with long-haired edges; spike lax, midlong, non-waxy, erect to inclined; lemma awn long and rough; glume awn shorter than the length of the glume; glumes one-half to two-thirds the length of the lemma, covered with long hairs; rachilla long haired; lemma with depression at base; stigma hairy; kernels covered, white, long; hulls slightly wrinkled to semi-wrinkled.

Yield:	98% of 2-22-9
	108% of Signal
	121% of Bold
	150% of Arivat
Bushel weight:	1 pound more than 2-22-9
	1 pound more than Signal
	2 pounds more than Bold
	5 pounds more than Arivat
1000-seed weight:	110% of 2-22-9
	109% of Signal
	115% of Bold
	137% of Arivat
Heading date:	6 days earlier than 2-22-9
	9 days earlier than Signal
	13 days earlier than Bold
	11 days earlier than Arivat
Harvest date:	4 days earlier than 2-22-9
	8 days earlier than Signal
	11 days earlier than Bold
	9 days earlier than Arivat
Plant height:	2-1/2 inches taller than 2-22-9
	3 inches taller than Signal
	10 inches taller than Bold
	1 inch taller than Arivat

SUPPORT DOCUMENTATION FOR THE RELEASE OF 'SECO' BARLEY

Table 1. Yields per acre and percentage of nursery average of lines and varieties grown under a one-irrigation regime.

Year and Location	Variety or Line											
	2-22-1		2-22-9		Arivat		Bold		Signal		Nursery	
83-IM-6821	2872	98	3503	120			2614	89	3323	114	2924	100
83-CG-6821	4135	109	4411	116	2671	70	3798	100	3963	104	3807	100
83-M-6821-N	5755	105	5133	94	4703	86	5672	103	5684	104	5489	100
83-M-6821-D	4692	110	4546	107	2943	69	4170	98	4360	102	4260	100
84-M-6821	2889	117	2715	110	2194	89	2172	88	2433	98	2473	100
85-CG-6821	2674	117	2537	111	1644	72	1893	83	2363	103	2288	100
85-CG-6822	2849	111			2058	80	2365	93	2953	116	2555	100
85-M-6821	2341	116	2491	123	1419	70	1909	94	1906	94	2021	100
86-M-6821	1500	123	1520	124	820	67	1066	87	1182	97	1255	100
86-Ma-68233	2423	119					2114	104	2254	111	2035	100
86-M-64-A	2101	137	2124	138	1029	67					1539	100
86-M-64-C	2289	138	2265	137	1155	70					1653	100
86-M-64-D	2026	128	2013	128	1047	66					1578	100
Average		118		120		73		94		104		100

Table 2. Yields per acre and percentage of nursery average of lines and varieties grown under different culture regimes.

	Variety or Line											
Regime	2-22-1		2-22-9		Arivat		Prato		Gustoe		Barcott		Nursery	
High-28-A	3616	89	4166	102	2757	68	3848	94	5431	133	4672	114	4082	100
High-28-C	3684	88	3953	95	2995	72	3762	90	5971	143	4656	112	4170	100
High-28-D	3515	89	3588	90	2680	68	3613	91	5695	144	4701	119	3965	100
High-Average		89		96		69		92		140		115		100
Med.-41-A	3973	102	3667	94	3403	88	3848	99	4674	120	3753	97	3886	100
Med.-41-C	4017	91	4101	93	3853	87	4416	100	5518	125	4522	103	4405	100
Med.-41-D	3287	87	3493	92	3170	84	4145	109	4583	121	4080	108	3793	100
Med.-Average		93		93		86		103		122		103		100
Low-64-A	2101	137	2265	138	1029	67	1235	80	1130	73	1616	105	1539	100
Low-64-C	2289	138	2265	137	1155	70	1381	84	1015	61	1812	110	1653	100
Low-64-D	2026	128	2013	128	1047	66	1570	100	1305	83	1506	95	1587	100
Low-Average		134		134		68		88		72		103		100

Table 3. Yields per acre and percentage of nursery average of lines and varieties grown in California in dry land nurseries.

	Variety or Line				
Location	2-22-1	2-22-9	Prato	Briggs	Nursery
Yolo	2150 96	2630 117	1960 88	2160 96	2240 100
SLO	1390 73	1860 95	1380 72	1710 90	1910 100
Tulare	1810 115	2510 160	1920 122	1660 106	1570 100
Average	95	124	94	97	100

Table 4. Yields per acre and percentage of nursery average of lines and varieties grown in California in irrigated nurseries.

	Variety or Line				
Location	2-22-1	2-22-9	Prato	Briggs	Nursery
Butte	6430 82	5150 66	8130 104	7430 95	7840 100
Sutter	3410 56	4070 67	6320 104	6010 99	6070 100
Davis	3940 88	3420 76	4890 109	4220 94	4480 100
Merced	4250 84	4010 79	5280 105	5240 104	5050 100
West Side	5240 75	5720 82	7300 105	5940 85	6950 100
Kings	4130 74	5360 96	5400 97	5320 95	5560 100
Kern	5410 89	5250 87	6160 102	5980 99	6060 100
Average	78	79	104	96	100

Table 5. Yields per acre and percentage of nursery average of lines and varieties grown in the Western Dryland Spring Nursery.

Location	Variety or Line							
	2-22-1		2-22-2		"best"		Nursery	
Lethbridge ALTA	786	96	1009	123	1107	135	822	100
Tetonia ID	1866	83	1857	83	2590	115	2250	100
Soda Springs ID	2616	80	2822	86	3920	120	3268	100
Havre MT	804	122	1009	153	1411	214	661	100
Sidney MT	1706	91	2143	114	2375	127	1875	100
Moccasin MT	938	67	1286	92	1715	122	1402	100
Conrad MT	616	59	982	94	1393	133	1045	100
Bozeman MT	1795	93	1723	89	2438	126	1929	100
Williston ND	1107	78	1411	99	1777	125	1420	100
Dickinson ND	2027	70	2420	83	3527	121	2911	100
Langdon SD	2893	78	2393	64	4349	117	3733	100
Moro OR	1920	93	2045	99	2322	112	2072	100
Pendleton OR	2188	80	2750	100	3483	127	2750	100
Huntley OR	1304	101	1554	121	1643	128	1286	100
Sherman OR	2911	106	2643	96	3286	119	2750	100
Swift Current SK	929	91	1009	100	1420	139	1018	100
Lind WA	786	73	759	71	1456	135	1081	100
Sheridan WY	1795	89	1974	97	2518	124	2027	100
Average	1607	85	1768	93	2090	110	1902	100